

EXHIBIT E

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Johnson et al.

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[54] JUST-IN-TIME REQUISITION AND INVENTORY MANAGEMENT SYSTEM

[75] Inventors: James M. Johnson, Bridgeville;
 Douglas A. Momyer, Upper St. Clair,
 both of Pa.

[73] Assignee: Fisher Scientific Company, Pittsburgh,
 Pa.

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 395/200.03; 395/601; 364/468.05; 364/468.14;
 235/385

[58] Field of Search 395/600, 165,
 395/155, 161, 228, 729; 364/468, 413.01,
 401, 403, 478, 188-189, 468.05, 468.14;
 235/375, 385, 383

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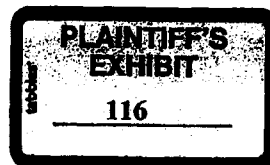
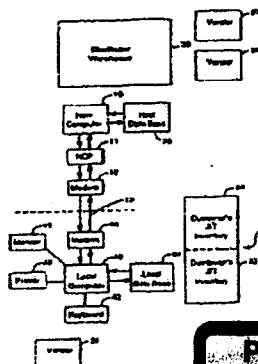
Primary Examiner—Thomas G. Black
 Assistant Examiner—Hosain T. Alam
 Attorney, Agent, or Firm—Genc A. Tabachnick; Reed Smith
 Shaw & McClay

ABSTRACT

[57] In accordance with the present invention, a requisition and inventory management system is provided which employs both a host computer and a local computer which can be linked to permit two-way data communications in a real time environment. Each computer has an associated database which can be accessed by that computer. By accessing its respective database, each computer can build and transmit to the other computer communications blocks of data relating to a particular requisition of an item in Just-in-Time (JIT) inventory or to the management of the JIT inventory. The other computer can then use the received data to continue processing of the requisition or to update its JIT inventory records. Thus requisition records are created from a real-time interaction between the host and local computers, with each computer using data from its respective database in conjunction with information entered by a Customer Service Representative (CSR) operating the local computer.

The system of the present invention also utilizes means for automatically determining which items in the JIT inventory are likely to require replenishment. The system then proposes a purchase or transfer order for an optimum quantity of the item, which the CSR may accept or modify.

38 Claims, 12 Drawing Sheets



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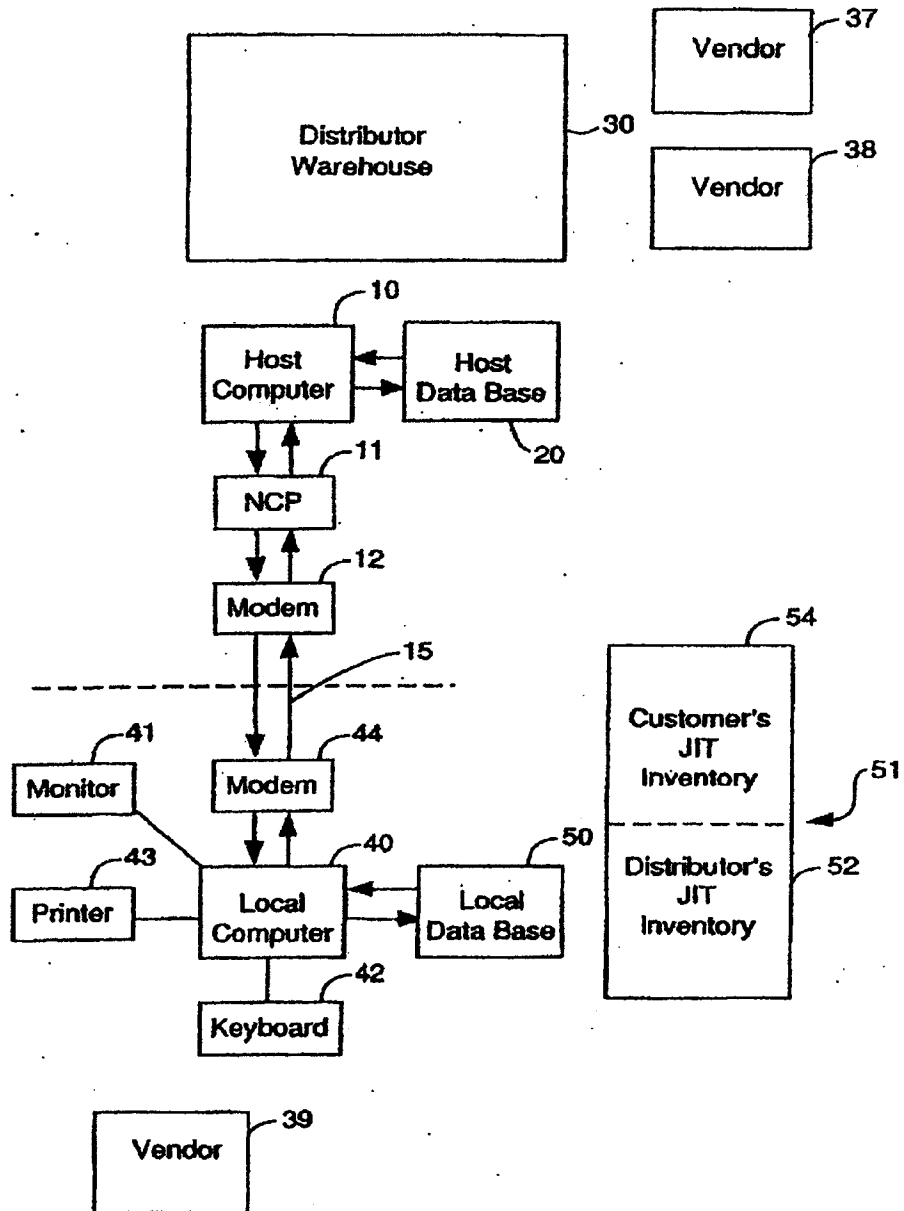


FIG. 1

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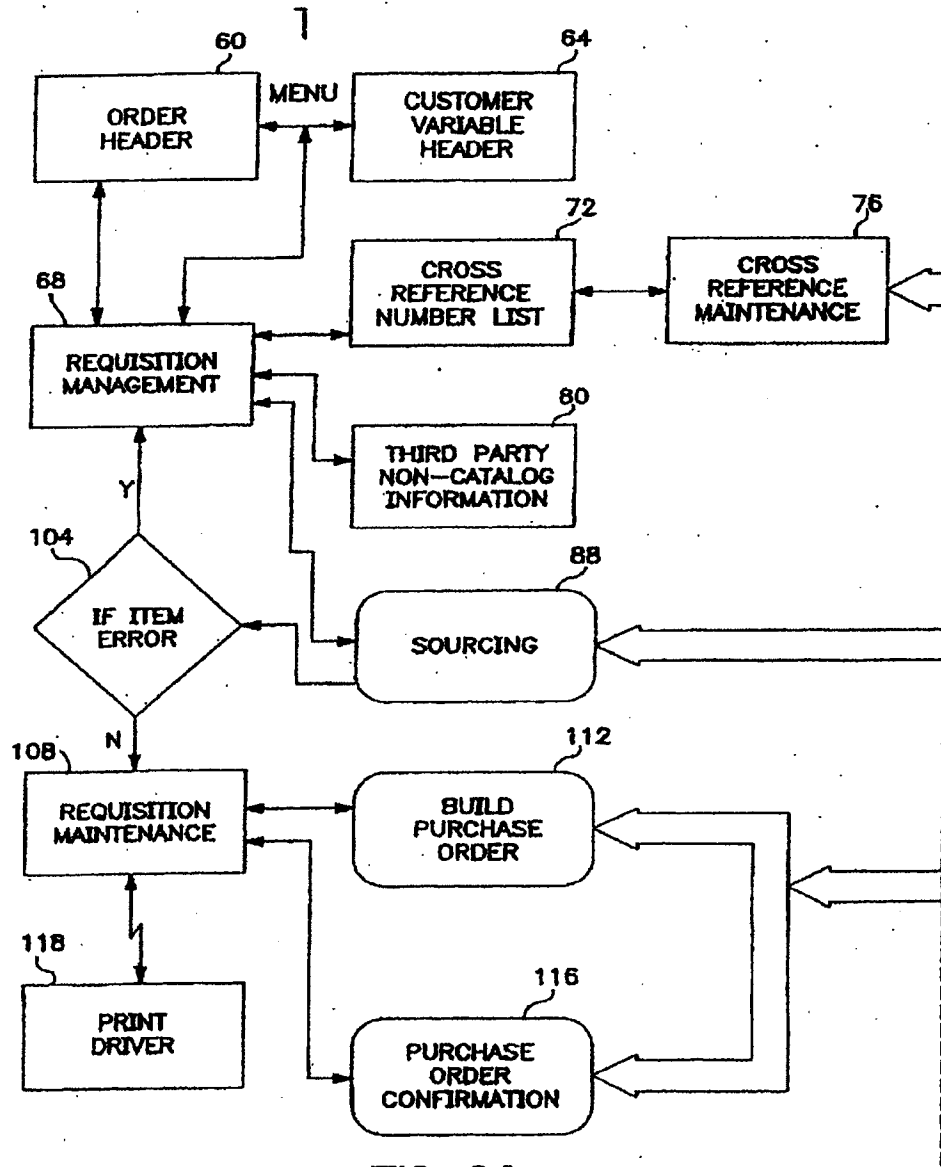


FIG. 2A

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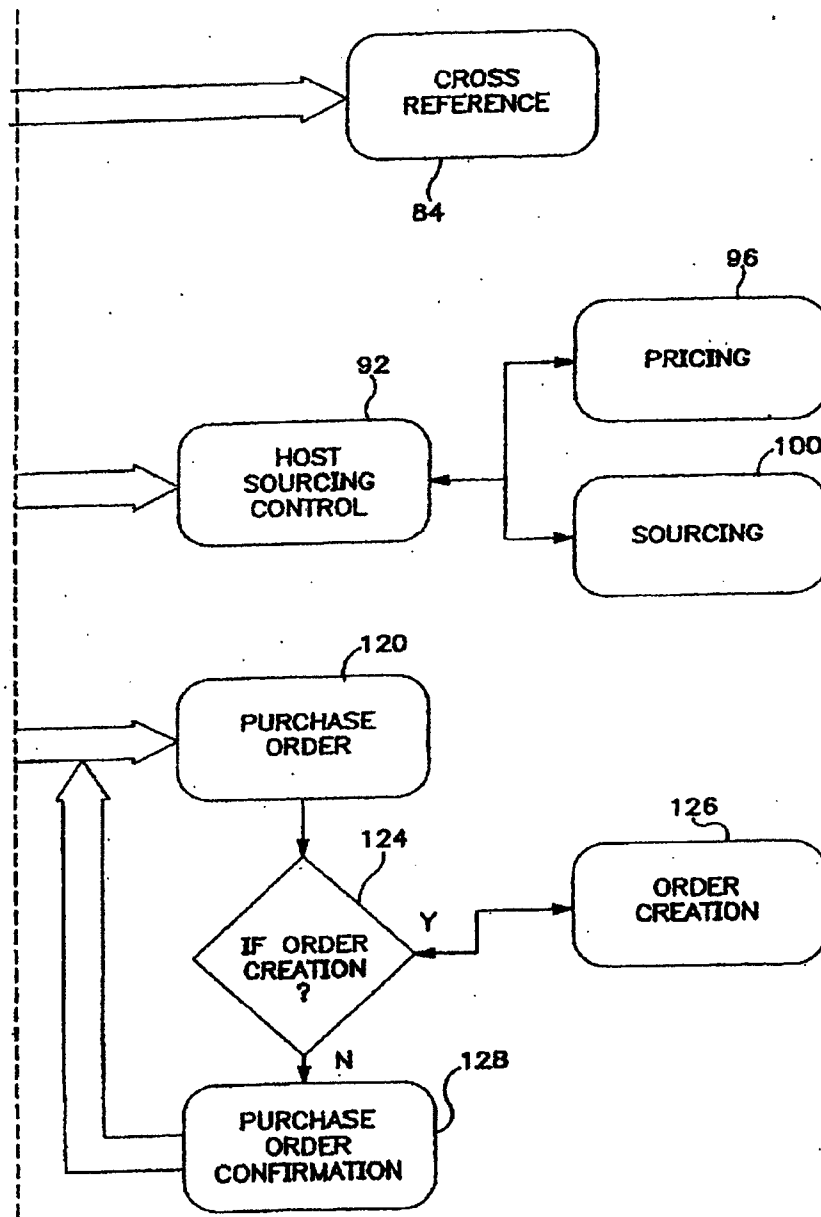


FIG. 2B

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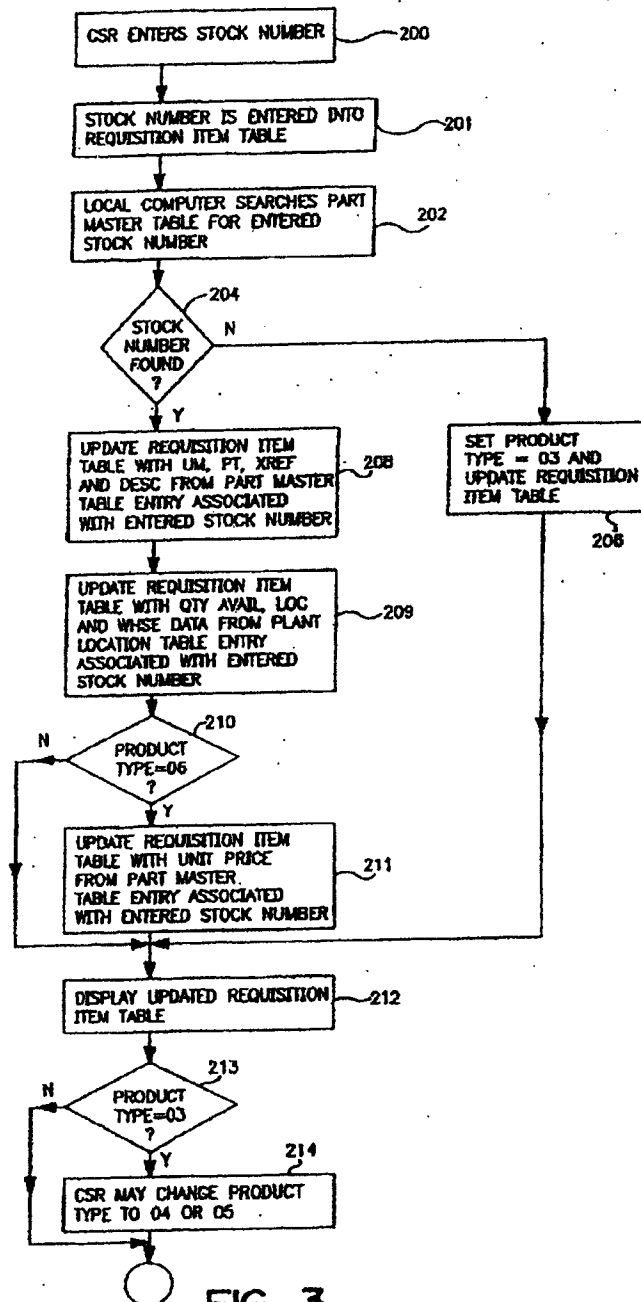


FIG. 3

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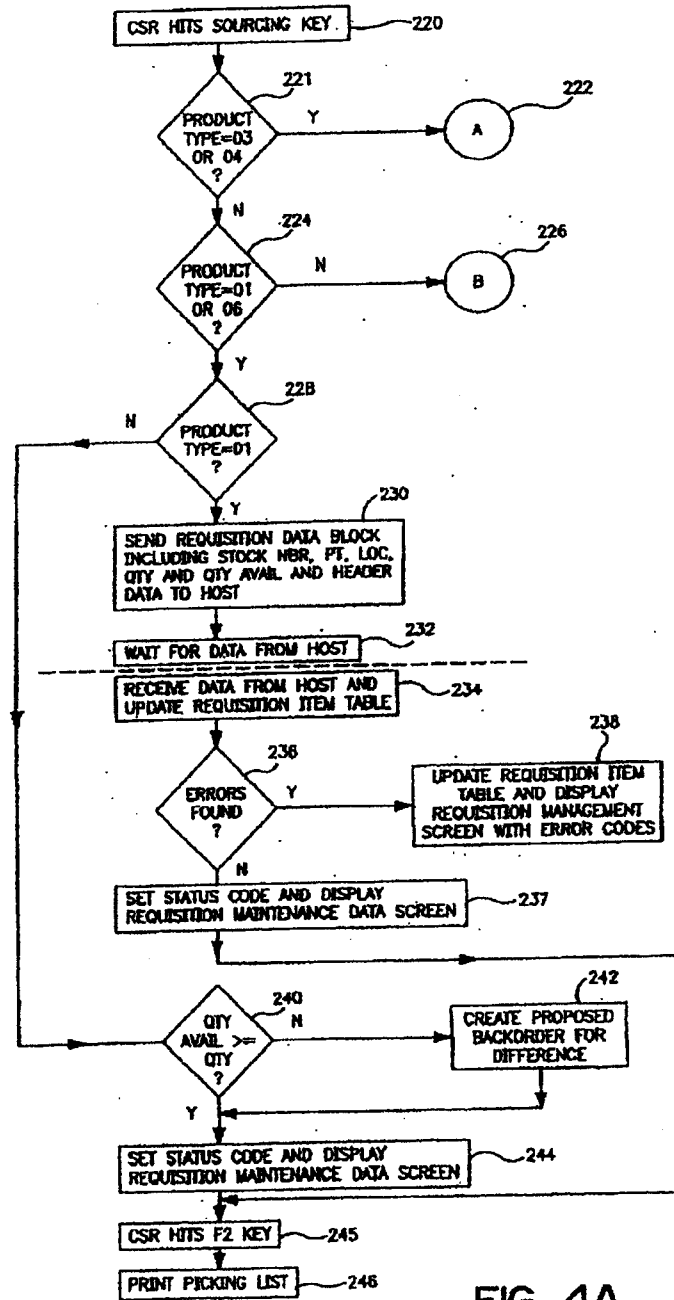


FIG. 4A

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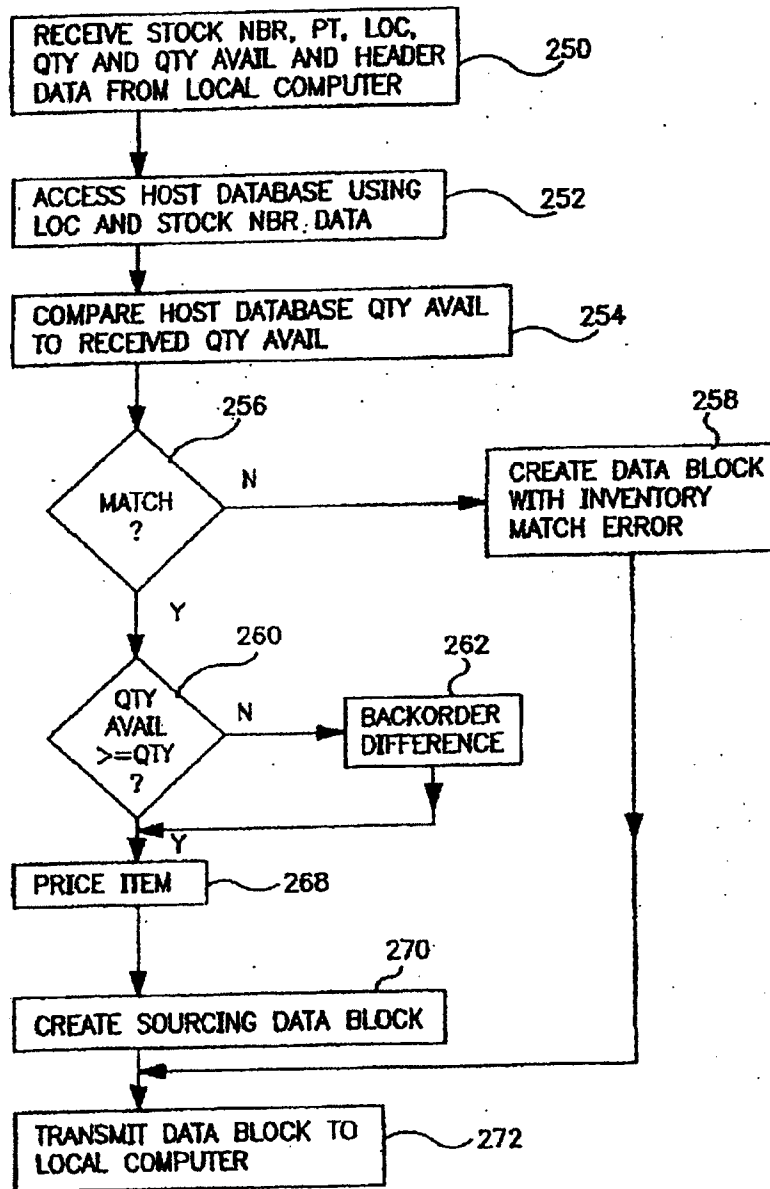


FIG. 4B

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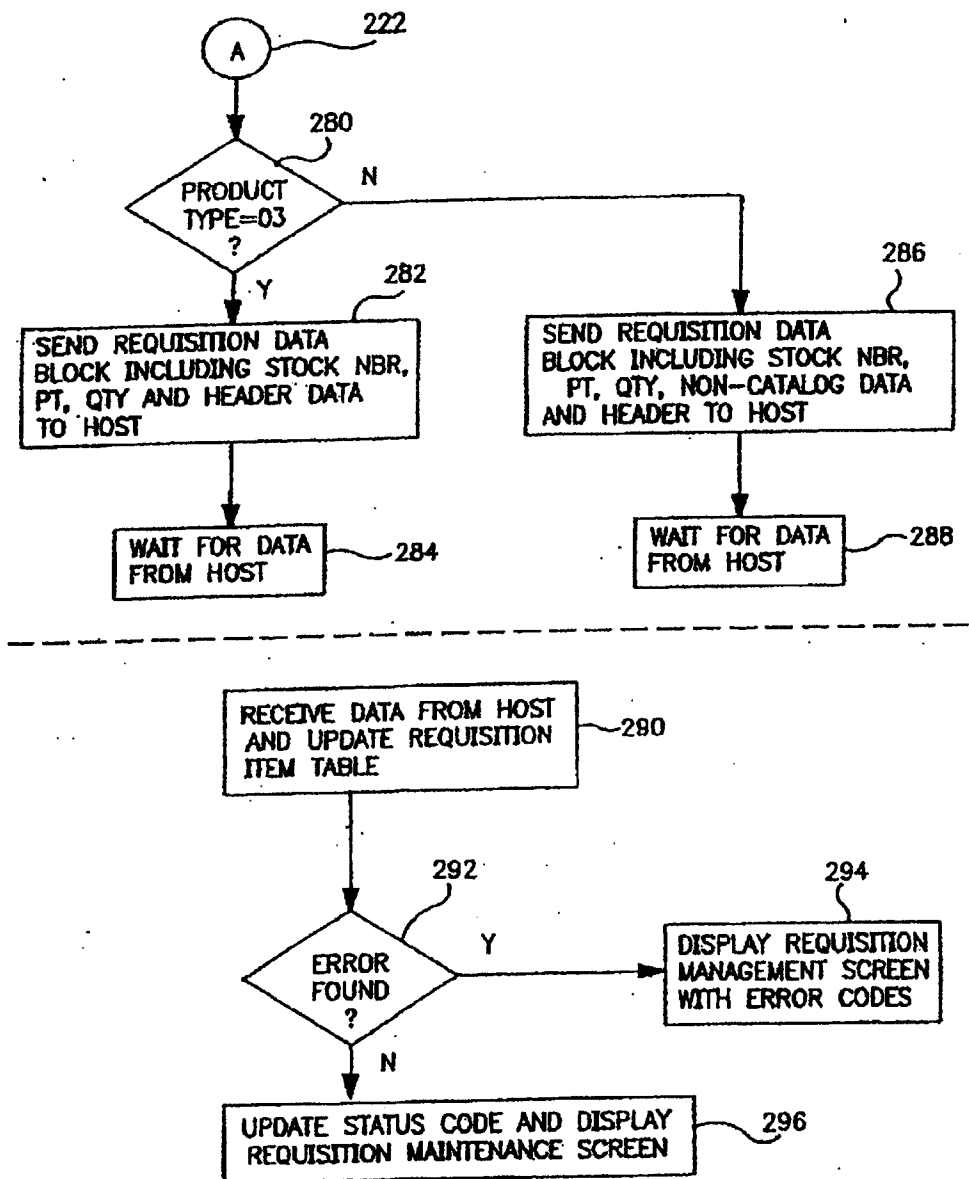


FIG. 4C

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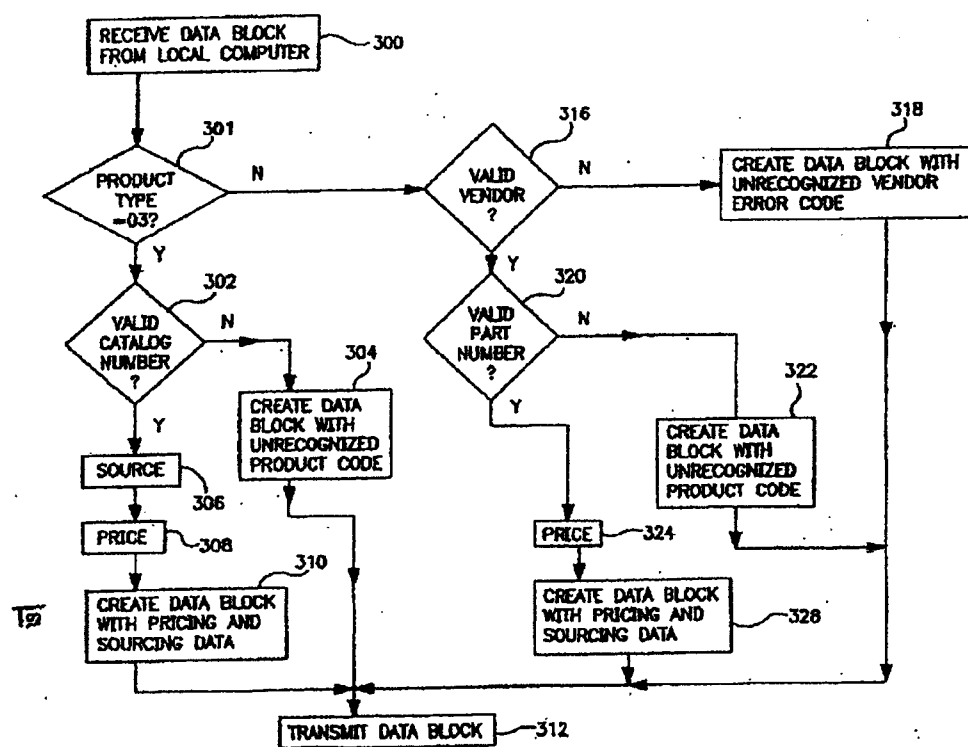


FIG. 4D

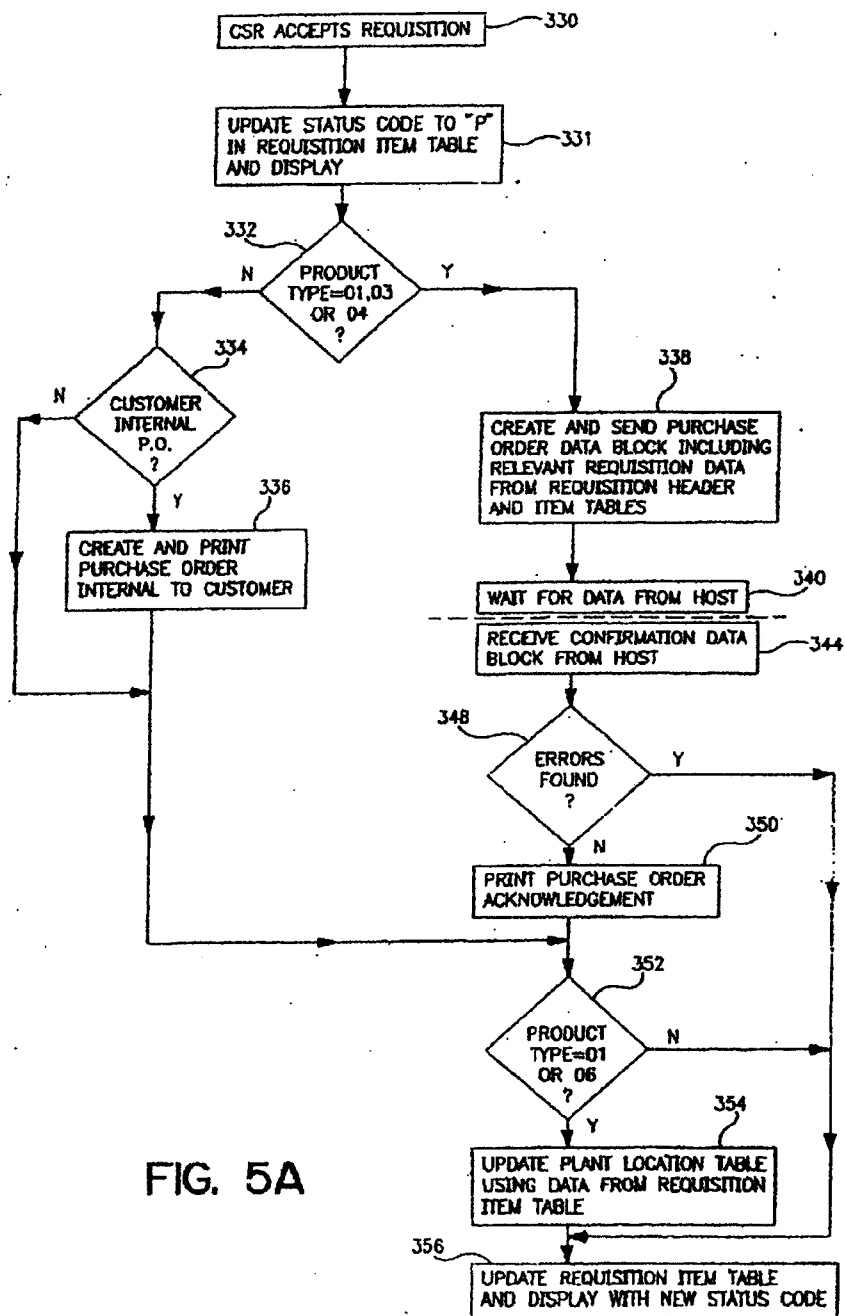
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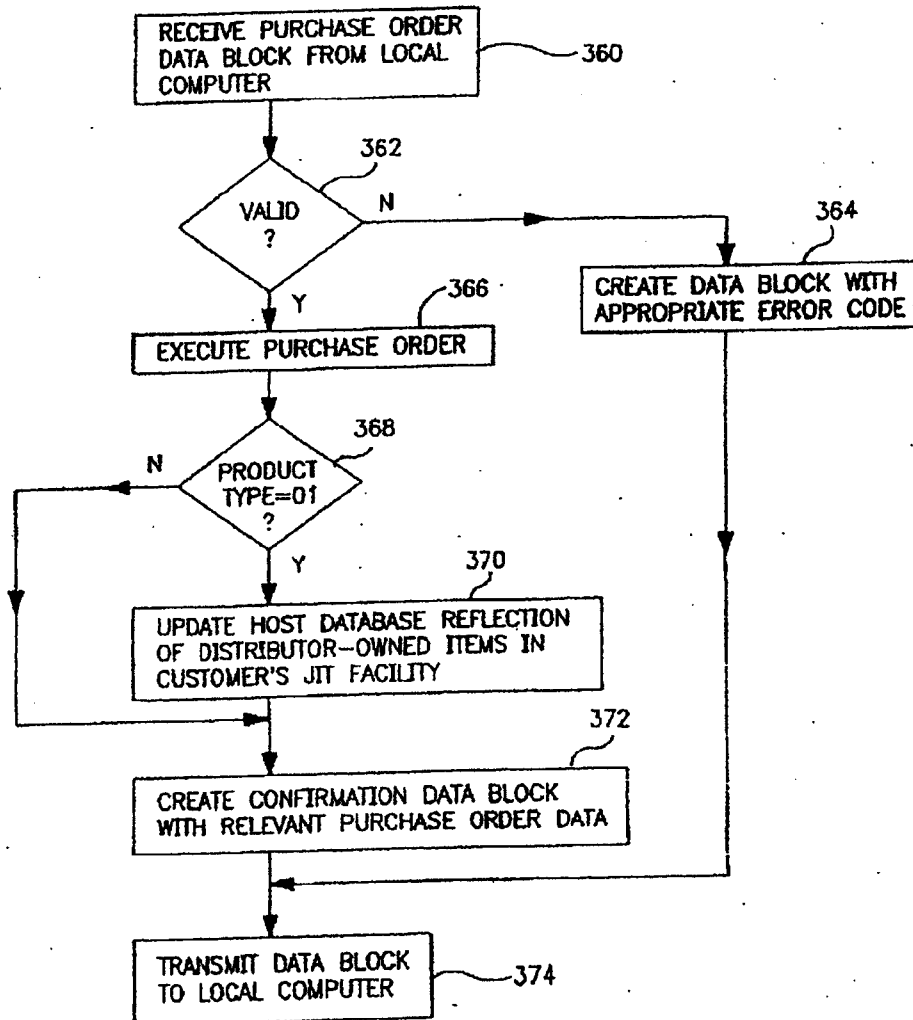


FIG. 5B

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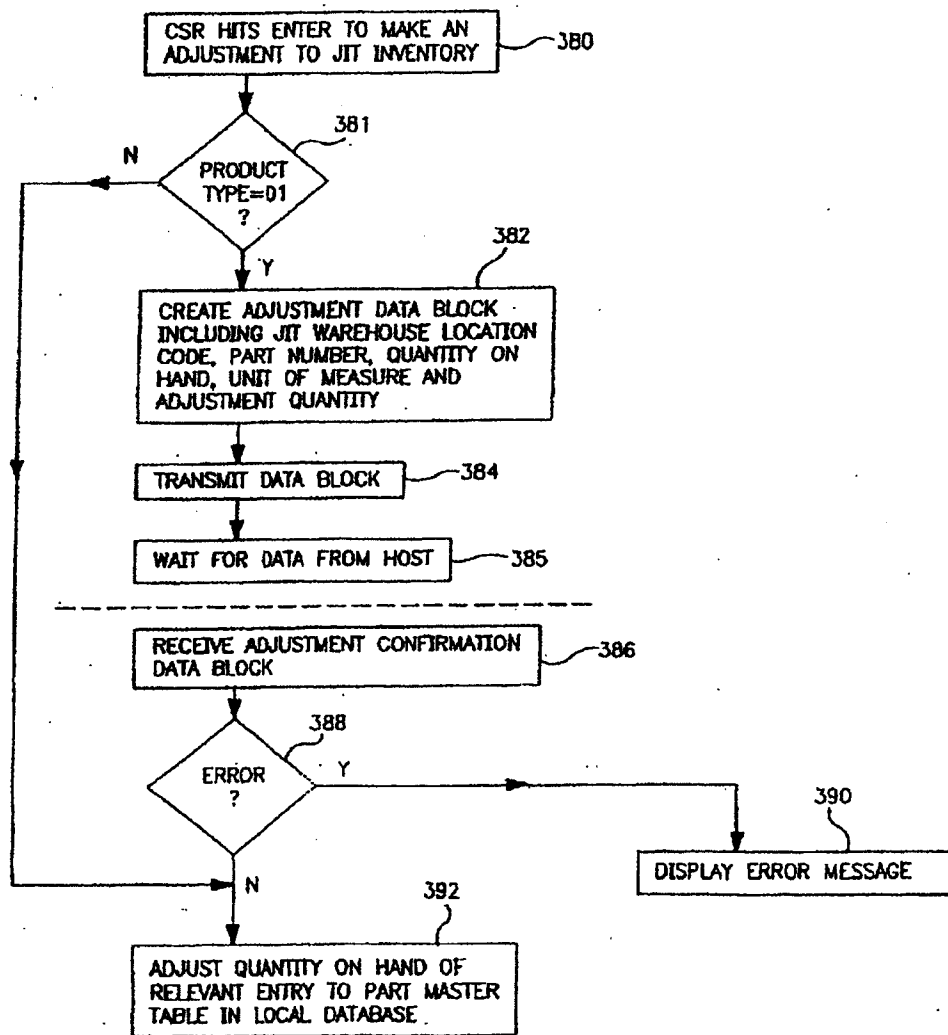


FIG. 6A

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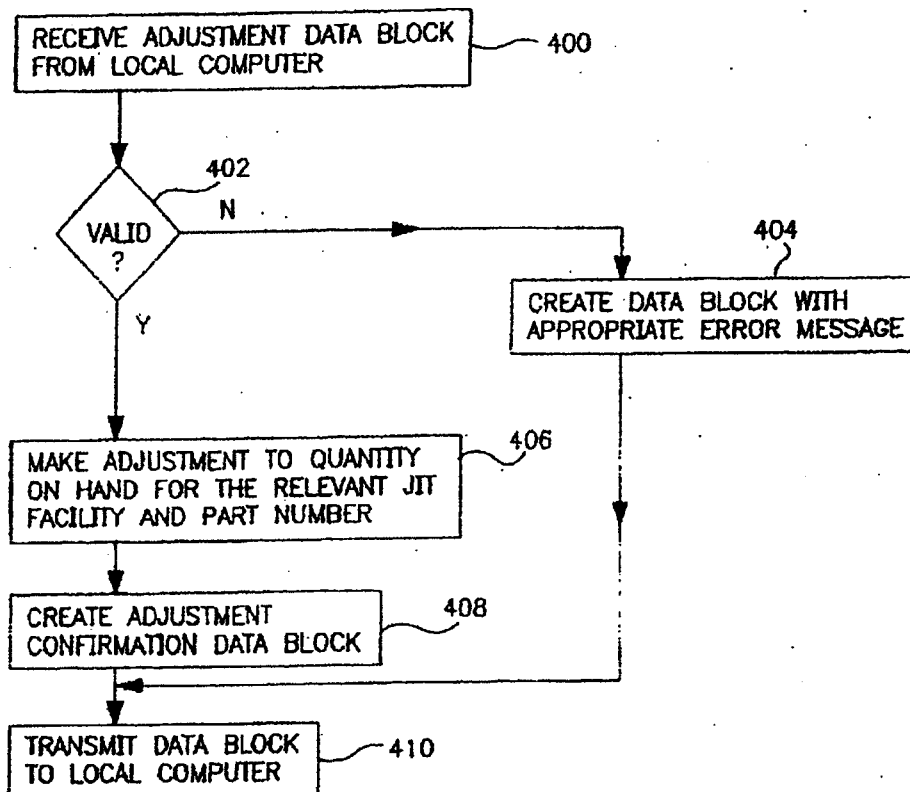


FIG. 6B

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JUST-IN-TIME REQUISITION AND INVENTORY MANAGEMENT SYSTEM

BACKGROUND OF THE INVENTION

This invention generally relates to systems for requisition and inventory management. Requisitioning systems that manage and process purchase orders are well known in the art. One such system—the Fisher Scientific Reliance™ system—has been used by the customers of Fisher Scientific, the assignee of the present application, for some time. Other such systems are described in U.S. Pat. Nos. 4,887,208 and 4,972,318. Such systems generally process purchase orders for items and track a local inventory. These systems employ essentially one-way communications between a terminal or local computer and a host computer to initiate purchase orders; the systems may also manage a local inventory.

Such prior art systems do not, however, provide the capability for effectively managing a Just-In-Time (JIT) inventory site. Many businesses and organizations are seeking to implement JIT inventory stockrooms to make the most efficient use of available space and manpower, while at the same time avoiding costly delays caused by waiting for out of stock items. Supplier and customer organizations will sometimes agree that the supplier will retain ownership of the inventory at the JIT site, which is reserved for subsequent sale to that customer. Other times, they will agree that the customer will own the inventory at the JIT site, but that it will continue to be managed and replenished by the supplier. Frequently, the supplier and customer will establish a JIT site containing some products owned by the customer and others owned by the supplier.

The demands of JIT inventory management are not well met by the requisitioning and inventory management systems of the prior art. Where the JIT inventory is owned by the supplier, the supplier will generally require access to a database reflecting the contents of the JIT inventory for billing and other purposes. Access to a database reflecting the contents of JIT inventory will also be needed at the customer site to permit effective inventory management. The systems of the prior art do not provide the flexibility necessary to allow both the supplier and a representative at the customer site to access the necessary data. Nor do prior art systems employing essentially one-way communication between a local terminal or computer and a distributor host computer readily provide the customer with up-to-the-minute information regarding the distributor's stock of various items or the status of pending purchase orders. Such information is critical to effective management of JIT inventory.

At least one prior requisitioning system—a predecessor version of the Requisitioning and Inventory Management System (RIMS) described in the present application—has employed two-way communications between local and host computers for processing requisitions. This earlier system has been in use by Fisher Scientific since 1991. Although this earlier system employed a two-way communications link similar to that employed in the preferred embodiment of the present invention, it did not have any capability for managing a local JIT inventory. Indeed this earlier system was merely a system for requisitioning items from a Distributor's usual inventory. Thus this earlier system did not employ a database for tracking a JIT inventory.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a requisition and inventory management system which can effectively process

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requisitions for items of various types including items available in JIT inventory.

It is also an object of this invention to provide a system for replenishing and managing a JIT inventory.

In accordance with the present invention, a requisition and inventory management system employs both a host computer and a local computer which can be linked to permit two-way data communications in a real time environment. Each computer has an associated database which can be accessed by that computer. By accessing its respective database, each computer can build and transmit to the other computer communications blocks of data relating to a particular requisition of an item in JIT inventory or to the management of the JIT inventory. The other computer can then use the received data to continue processing of the requisition or to update its JIT inventory records. Thus requisition records are created from a real-time interaction between the host and local computers, with each computer using data from its respective database in conjunction with information entered by a Customer Service Representative (CSR) operating the local computer.

The system of the present invention also utilizes means for automatically determining which items in the JIT inventory are likely to require replenishment. The system then proposes a purchase or transfer order for an optimum quantity of the item, which the CSR may accept or modify.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the invention will be apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which like reference characters refer to like parts throughout, and in which:

FIG. 1 is a diagram showing the overall system of the present invention and the environment in which it is used;

FIGS. 2A and 2B are diagrams showing the flow of control and interaction between the various programs and data screens of the local computer and the programs of the host computer used for requisition management in an embodiment of the system of the present invention;

FIG. 3 is a flowchart describing a program employed by a local computer in an embodiment of the system of the present invention to associate a product type with an item code which has been entered by the CSR;

FIGS. 4A through 4D are flowcharts describing programs employed by an embodiment of the system of the present invention to source requisitioned JIT inventory owned by either the distributor or the customer, other inventory owned by the Distributor, and inventory owned by other vendors;

FIGS. 5A and 5B are flowcharts describing programs employed by an embodiment of the system of the present invention to accept a sourced requisition; and

FIGS. 6A and 6B are flowcharts describing programs employed by an embodiment of the system of the present invention to adjust the quantity on hand of an item in JIT inventory.

DETAILED DESCRIPTION OF THE INVENTION

The requisition and inventory management system of the present invention, which is shown in FIG. 1, employs at least two computers—a host computer 10 located at a Distributor site and a local computer 40 used by a Customer Service Representative (CSR) at or near the customer site and the site of JIT inventory. As will be described below, host

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computer 10 and local computer 40 are preferably linked in a network employing the formats and protocols of IBM's Systems Network Architecture (SNA).

Most computer 10 can be substantially any mainframe or minicomputer capable of running the desired programs and conducting the required communications. Preferably, the host computer is a mainframe computer (such as an IBM model 3090) running the MVS operating system, the MVS-CICS application and a Virtual Telecommunication Access Method (VTAM) communications network. Host computer 10 controls all inventory, pricing and requisitioning operations of the Distributor's regularly stocked items using host pricing and inventory database 20 (which is actually comprised of several databases, as will be described below) in a manner which is well known to those of ordinary skill in the art. Host database 20 is preferably stored in an appropriate storage device, such as a IBM 3390 disk drive which may employ caching. Inventory portions of database 20 includes data describing the items and quantities thereof available at a particular Distributor warehouse 30 and at other Distributor warehouses. Other portions of database 20 includes item records for each Product regularly sold by the Distributor. Each item record preferably includes information such as Distributor's catalog or part number for the Product, Distributor's list price, Distributor's current cost, Distributor's supplier (vendor) for the Product and a code identifying the Product as part of a product grouping to be treated similarly for customer discounting purposes. Database 20 also preferably includes discount records, by customer, that enable the host computer 10 to calculate at any time a net price for a particular Product to a particular customer in a manner well known to those of ordinary skill in the art. As described below, database 20 may contain cross-references from Distributor's catalog number to its vendor's part number and to similar catalog numbers of other suppliers or distributors for the same Product, either as a part of the item record, in a separate cross-reference file or both.

Database 20 may also include file records identifying the items and quantities thereof of Distributor-owned inventory in various JIT sites at or near the locations of various of Distributor's customers. As described more fully below, such file records for Distributor-owned inventory held for a particular customer (Customer) represent a reflection of similar records maintained by a local computer 40 which manages requisitions and inventory for that Customer.

Database 20 may also include file records for items which Distributor does not routinely supply to all customers, but has agreed to purchase for supply to particular customers, on a special or third party procurement basis. Such file records do not contain a Distributor list price, a discount code or a Distributor catalog number or part number, but will contain other information as described above for regular item records including a vendor, a vendor part or catalog number and a vendor list price.

Local computer 40 is preferably a microcomputer capable of operating the required programs and of transmitting and receiving the required communications, such as an IBM PS/2 Model 80, running the OS/2 operating system and also running the CICS OS/2 application, both of which are available from IBM.

Host database 20 also includes data regarding Distributor's cost prices and vendors for items from third-party suppliers 37 and 38 which are regularly distributed by Distributor to its customers. Host database 20 also includes data regarding items from third-party suppliers 39 whose products the Distributor does not routinely supply to its

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customers. Distributor may elect to stock in Distributor warehouse 30 some or all of the items of a particular vendor of either type 38 or of type 39.

Local computer 40, which can be any microcomputer or workstation having adequate memory and communications capabilities, preferably includes 8 to 16 megabytes of RAM and a hard disk drive of 300 to 600 megabytes. Local computer 40 also preferably includes a Multi-Protocol Adapter communications card, or a similar communications card, capable of supporting the LU6.2 communications protocol (available from IBM). Local computer 40 includes a color monitor 41 and a conventional alphanumeric keyboard 42 including twelve function keys F1, F2, . . . F12. Printer 43 is also attached to local computer 43.

In addition to the OS/2 operating system, the hard disk drive of local computer 40 also contains the OS/2 Database Manager, the OS/2 Communications Manager and CICS OS/2 (each of which is available from IBM). The hard disk drive may also contain other conventional utilities useful in setting up and updating the software used on local computer 40. Also on the hard disk drive of local computer 40 is a local database which is diagrammatically represented by block 50 of FIG. 1. Local database 50 is a relational database containing records describing the items and their respective quantities and prices of items currently stored in a Just-In-Time (JIT) facility 51, which may be a separate warehouse, a designated portion of Distributor's warehouse or a stockroom or other room located on a Customer's site. In this embodiment, certain items in the JIT facility 51 are Distributor-owned inventory 52, while others are Customer-owned inventory 54. While the present invention is applicable to the management of inventory at the JIT facility 51 which is all customer-owned inventory 54, in most cases the JIT facility 51 contains only Distributor-owned inventory 52 or contains both types of inventory 52 and 54. Where both types of inventory are present, each Product is usually located in a unique location or bin, but the bins containing Distributor-owned inventory 52 are not segregated from the bins containing Customer-owned inventory 54. Flexibility is preferably provided to redesignate certain products from Distributor-owned inventory 52 to Customer-owned inventory 54, or vice versa, by mutual agreement and transfer of title, without necessarily any movement of the Products from the existing bins.

The host computer 10 is linked to a telephone line 15 via a communication front end processor 11 (such as IBM models 3705 or 3723) running conventional operating software, such as IBM's Network Control Program (NCP) and a modem 12. The host computer 10 is running a VTAM communications network. The local computer 40 is linked to the telephone line via a DCU passthrough box (which may be of the type supplied by Racal Milgo) and is programmed with the Communications Manager application. Data is preferably exchanged between host computer 10 and local computer 40 using the LU6.2 communications protocol. Using the LU6.2 communications protocol local computer 40 can create a block of data conforming to a predetermined format which can be transmitted to host computer 10. The host computer 10 can then process the data and create its own block of data containing some or all of the results of that processing. This block of data, which may conform to another predetermined format, can then be transmitted back to local computer 40. Local computer 40 enters a wait state after transmitting a block of data to host computer 10. In this and in other instances where local computer 40 enters a wait state, the CSR can access and run other programs on local computer 40 while in the wait state. Local computer 40 stays

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in its wait state until it receives a response from host computer 10 in the form of a block of data as described above. This permits what has been called distributed transaction processing whereby two separate programs or tasks on two separate computers engage in a synchronized exchange to accomplish a job between them.

Distributed transaction processing enables host computer 10 and local computer 40 to easily and effectively manage databases having overlapping data content. In the preferred embodiment of the present invention, data describing Distributor's JIT inventory 52 is maintained by host computer 10 in host database 20 and by local computer 40 in local database 50. Each time the local database 50 is modified as to an item in Distributor's JIT inventory 52, the same update must be made to the relevant records on the host database 20. Distributed transaction processing is employed both to make the updates and to insure that the data in the respective databases are in agreement prior to execution of any transaction in the system, such as a purchase order.

In a preferred embodiment of the invention, the system provides requisitioning and inventory management for five distinct product types. The first such product type—type 01—covers products owned by the distributor which are stored at a Just-In-Time (JIT) warehouse either at the customer location or nearby. The present system maintains inventory records for product type 01 products in both local database 50 and host database 20. Another product type—type 03—comprises the items regularly sold by the Distributor, some of which are stored at Distributor's warehouse 30, some of which are regularly ordered by Distributor from vendors such as vendor 37 for direct shipment to any of Distributor's customers. Such regular Distributor products are identified by a Distributor list price and a Distributor part or catalog number (which may be the same, a derivative of or different from the part number associated with the product by vendor 37). Another product type—type 04—comprises items which Distributor does not regularly purchase for resale, but which Distributor can and elects to order from a vendor 38 (who may be a supplier to Distributor of other products) for sale to particular customers such as Customer. Products of product type 04 can be stocked by Distributor at Distributor Warehouse 30, but are often ordered by Distributor for direct shipment to Customer. Products of product type 05 are those which Distributor does not stock and is unable or unwilling to purchase for the Customer, but which the Customer has arrangements to purchase from an outside vendor 39. The present system has a limited role in Customer's purchase of price type 05 products, primarily of a record-keeping nature. Finally, product type 06 comprises products owned by the Customer and maintained as Customer-owned inventory 54 in the JIT facility 51. Whether replenished by the Customer from Distributor or from an outside supplier, the present system maintains inventory records on product type 06 products in the local database 50, but not in the host database 20. These product types are summarized in Table 1:

TABLE 1

PRODUCT TYPE	DESCRIPTION
01	Distributor owned item in JIT warehouse located at or near the Customer's site
02	This price type is not currently used, but has been reserved for

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TABLE 1-continued

PRODUCT TYPE	DESCRIPTION
	Distributor-owned items in Distributor's warehouse 30 which have been segregated in some fashion for a particular Customer.
03	Distributor catalog item; stored in Distributor's warehouse
04	3rd party item that Distributor orders
05	3rd party item which CSR or Customer orders
06	Customer owned item located in Customer warehouse at or near Customer site

Requisitioning

Requisitioning on the system of the present invention is described in FIGS. 2A and 2B. In FIGS. 2A and 2B, the diamonds represent decisions. The rectangles represent data screens as well as programs associated with those data screens. The rounded rectangles represent programs not associated with data screens such that, while these programs are running, the prior data screen may remain visible without, necessarily, being operational for the input of data. The programs associated with the data screens enable the CSR to display and modify the contents of various tables associated with particular data screens. These tables make up local database 50, which can be any relational database.

As the data (e.g., Account Number, Requisition Number and Stock Numbers) associated with a single requisition are entered through the various data screens on local computer 40, that computer creates a set of Requisition Tables (a Requisition Header Table and a Requisition Item Table) for that particular requisition. The Requisition Tables are stored in local database 50, and can be accessed by local computer 40 using the Requisition Number to find the desired table.

The CSR will ordinarily receive a written or oral request from an employee of the Customer to requisition one or more items. For example, a laboratory technician may approach the CSR with a list of supplies to withdraw from an on-site JIT stockroom. In some forms of the invention, such a requisition request can be received by local computer 40 in electronic form through the customer's host computer (not shown on FIG. 1), through a telephone line or in electronic media such as a floppy disc. The first step in creating a requisition involves entry by the CSR of information in the Order Header data screen 60 in FIG. 2A. A sample of an actual Order Header data screen is set forth Table I. Generally, the CSR need only enter the Account Number and a Requisition Number. Hitting the ENTER key after entering the Account Number (which is the Distributor's designation for the customer department for which the requisition is placed) will automatically cause the correct Name and Address associated with that Account Number to be entered into the appropriate fields of data screen 60. Local computer 40 accomplishes this by comparing the entered Account Number to a table of account number records in local database 50 which contains certain basic information associated with each Account Number record stored therein. This database table has been previously created by the CSR using the associated Customer Account Maintenance data screen, a sample of which is shown in Table XIII.

A Requisition Number is also required for each requisition. The CSR must also enter this information in the appropriate field of the Order Header data screen. The

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requisition number can be the customer's own internal requisition number, or can be any unique number assigned to the requisition by the CSR. Various additional information may also be inputted, such as the name of the person needing the items ordered in the requisition, the name of the person who called the CSR to place the requisition, etc.

The ORDER TYPE field on Order Header data screen 60 can have one of three values: "R" for an ordinary Requisition; "T" if the requisition was generated to replenish Customer-owned JIT inventory 54, as will be discussed below; and "G" if the order is for returning JIT inventory to JIT facility 51, as will be discussed below. The ordinary Requisition order type ("R") is the default.

At the bottom of the screen are several fields which describe the function of various function keys (e.g., F1, F2 etc.). In this data screen, the CSR can preferably obtain help online by hitting the F1 key. The online help facility functions in a conventional manner that will readily be understood by those of ordinary skill in the art. Hitting the F3 key would permit the CSR to quit the program; hitting F4 would erase the contents of any of the fields into which data had been previously entered to permit a new requisition to be entered. Hitting F11 would permit the CSR to change the requisition number to enter a new requisition. Hitting F12 permits the CSR to cancel an open requisition.

Function keys F2, F5 and F6 all cause the system to jump to a new program or data screen. F2 causes the program to jump to Requisition Management data screen 68 as shown in FIG. 2A. Hitting F6 will cause the system to enter the sourcing program 88 shown in FIG. 2A, provided that the CSR has already entered the necessary information on the Order Header data screen 60 and one or more items on the Requisition Management data screen 68, as will be discussed below. If the CSR has just begun the requisition (and has not yet entered at least an Account Number, a Requisition Number and at least one item), then hitting F6 will have no effect. Because the CSR will not ordinarily initiate sourcing program 88 from Order Header data screen 60, no arrow is shown in FIG. 2A linking these programs.

It should be noted that function keys (F1, F2 etc.) are not the only means for directing the flow of the program shown in FIG. 2A. Each data screen and program also has a unique four character identification code. To go directly to a particular data screen or begin a subroutine, the CSR can enter the associated code into the RESPONSE field shown on any data screen along with any necessary parameters, which are entered in the KEY(S) field. For example, to Fast Path to Cross Reference Maintenance data screen 76, the CSR can enter the code CRNL into the RESPONSE field.

If the CSR hits the F5 key from Order Header data screen 60, the system jumps to the Customer Variable Header data screen 64 and associated program as shown in FIG. 2A. An example of a Customer Variable Header data screen 64 is set forth at Table II. This data screen allows the CSR to enter and edit information that the particular customer desires to be associated with the requisition due to requirements of the customer's internal accounting system or other systems. Examples of such customer variable information might be the names (or identification codes) of various customer divisions or customer projects. The CSR can define any desired fields for the Customer Variable Header data screen in the manner set forth below. Thus the Customer Variable Header data screen may contain one or more data fields into which the CSR may enter and edit data, such as a division name or identification code, of interest to the Customer but not, necessarily, to Distributor. This variable information is

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useful in preparing data sets such as Requisition summary reports, status reports, financial reports and the like which can be loaded periodically on request into the Customer's own host computer, either as a flat file or in a customized form.

If the CSR hits the F2 key from the Order Header data screen (or the F4 key from the Customer Variable Header data screen) the program jumps to Requisition Management data screen 68 in FIG. 2A. A sample Requisition Management data screen is set forth at Table III. The CSR uses this data screen to enter the catalog or stock numbers and quantities of the various items being ordered.

The Account Number and Requisition Number are automatically passed to Requisition Management data screen 68 and displayed at the top of the Requisition Management data screen 68 in the relevant fields. The CSR can now enter the items and quantities for the requisition. The item is identified by entering the Distributor catalog number of the desired item in the field below the STOCK NBR label on the appropriate line number in Requisition Management data screen 68. In the sample screen shown in Table III, the stock number A181 has been entered in the STOCK NBR field of line 001.

The CSR may also enter an item by using a catalog or reference number from a third-party supplier other than the Distributor where the same item has both Distributor and third-party catalog numbers (which are necessarily different). In the preferred embodiment, most records in local database 50 identify products by a stock number or part number compatible with the Customer's record-keeping system. Part Master records (see Table VI) also contain a manufacturer or supplier's catalog or part number, which will be the number used on purchase orders and, for product types 01 and 03, will be the Distributor's catalog or part number. The local database 50 contains a cross-reference file between such stock numbers and a particular supplier's catalog or part number. The creation of this cross-reference file by the CSR is described below.

When the CSR enters an item code in the STOCK NBR field and hits the ENTER key, local computer 40 begins a program described in the flowchart as shown in FIG. 3. The entered stock number appears on the data screen as it is being entered. In step 201, the entered stock number is added to the appropriate field of the Requisition Item Table in local database 50 along with the associated line number. In step 202, local computer 40 searches the Part Master Table in local database 50 for the STOCK NBR that has just been entered (which can be either the Customer's stock number or a valid cross-reference number such as a Distributor catalog number). (A description of how the Part Master Table in local database 50 is created by the CSR is set forth in detail below.) If the stock number is not found the Part Master Table in local database 50, as indicated in steps 204 and 206, the product type field defaults to product type 03. The display on the Requisition Management data screen 68 is then updated to reflect this information (the PT field displays "03") as shown in step 212. As described below, such designation of product type 03 will be verified during the Sourcing steps using the product records and cross-reference files contained in host database 20.

If, on the other hand, the entered stock number is found in the Part Master Table in local database 50, as indicated in steps 204 and 208, the Requisition Item Table in local database 50 is updated with the following information from the entry in the Part Master Table associated with the relevant stock number: the default unit of measure; the

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product type; the cross-reference number, if any; and a text description of the item. In step 209, Requisition Item Table is updated with the following information from the entry in the Plant Location Table in local database 50 associated with the relevant stock number: the quantity of the item available in the Customer-owned inventory 54 in the JIT facility 51 (for product type 06) or in the Distributor-owned inventory 52 in the JIT facility 51 (for product type 01); a description of the location of the item in the relevant stockroom or warehouse (e.g., by aisle and shelf); and a code identifying the relevant stockroom or warehouse. In steps 210 and 211, the Unit Price is added to the Requisition Item Table if the product type is 06. (The Plant Location Table is created and updated using the Plant Location data screen, a sample of which is set forth in Table VII.)

In the system of the present invention, a particular stock number will preferably be either Customer-owned (product type 06) or Distributor-owned (product type 01) in the local JIT, but not both. Thus a given stock number may or may not have a corresponding entry in the Part Master (or Plant Location) Table in local database 50; but, if a record exists there, there will be at one time only one record associated with the stock number. Thus, stock stored in the JIT facility 51 of one product (whether in a single bin or in multiple bins), will either be all customer-owned or all Distributor-owned. Customer and Distributor may, however, decide at any time to redesignate particular products from Customer-owned to Distributor-owned (with corresponding change of ownership and debit or credit to the applicable accounts). Such a change can be reflected in local database 50 using the Part Master, Plant Location and Inventory Adjustment data screens (samples of which are set forth in Tables VI, VII and VIII, respectively), without necessarily moving the inventory physically within the JIT facility 51.

In the instance where the stock number is found in the local database 50, the display of data screen 68 is then updated in step 212 by displaying: the default unit of measure (in the UM field); the product type (in the PT field); the cross-reference number, if any (in the XREF field); the list price of the item, if the product type is 06 (in the UNIT PRICE field); a text description of the item (in the DESC field); the quantity of the item available in the JIT facility 51 as Customer-owned inventory 54, product type 06, or as Distributor-owned inventory 52, product type 01 (in the QTY AVAIL field); a description of the location of the item in the relevant stockroom or warehouse (in the LOC field); and a code identifying the relevant warehouse (in the WHSE field).

At this time, if the product type is shown to be type 03, the CSR may edit this field to change the product type to 04 or 05, as shown in steps 213 and 214 of FIG. 3 if the CSR knows that the item is not regularly available from Distributor as a routine item. This editing will change both the displayed product type and the value of the product type field in the applicable field of the Requisition Item Table. Local database 50 includes as product type 01 items only a subset of the entire set of Distributor catalog items. Thus, in step 206, local computer 40 assigns a product type 03 by default to any item number which is not determined to be a product type 01 or 06—i.e., for which a Part Master record is not found in local database 50. As described below, host computer 10 will verify the 03 status for such products during sourcing and communicate information to local computer 40 to establish an error code for such 03 status if not found in host database 20. If the CSR fails to change the product type for an item which host computer 10 is unable to identify as a Distributor catalog item, an error will result

during sourcing when host computer 10 attempts to source the item. This error will be handled as discussed below.

The CSR can then enter the quantity of the item being requisitioned in the field below the QTY label in Requisition Management data screen 68. The entered quantity will be displayed on data screen 68 and this data will be entered into the appropriate field of the Requisition Item Table in local database 50. The unit of measure associated with this quantity is defined by the value in the UM field. In the example shown in Table III, this field is occupied by "EA," meaning that the unit of measure is a single unit for A181 (a single one liter bottle of acetone). This is the default unit of measure for this item and is the unit in which all records and computations are performed. An alternate unit of measure is preferably also provided (as is the case for many of the products in host database 20), which is a multiple of the standard unit (e.g., a "CS" or case of six such bottles of acetone). Within the Part Master Table, a unit price is maintained, but only for product type 06 will a unit price be displayed at this stage as indicated in steps 210 and 211 (during requisition management and before sourcing).

The CSR may use as many lines of the Requisition Management data screen 68 as are necessary to complete the requisition (up to a preset or default limit set by the system, e.g., 200 lines; or to a lower limit set by the CSR, e.g., 100 lines). Keys F7 and F8 allow the CSR to page forward and backward on Requisition Management data screen 68; the F9 key provides the next available line number at the top of the list of items (giving the CSR a new screen to work with). Hitting the F4 key creates a new requisition (to which the CSR must assign a new requisition number) with the same Customer Account Number and the associated address information. The F5 key causes a customer variable item data screen to be displayed, which enables the CSR to enter information that the customer desires to have associated with a given item. With the exception of the F10 key, the functions of the remaining function keys will be clear from the previous discussion.

Hitting the F10 key calls the Non-Catalog Information data screen 80 onto the screen of monitor 41. An example of a Non-Catalog Information data screen 80 is shown in Table V. This data screen is used to enter additional information about items not regularly sold by Distributor (for which host database 20 contains a Distributor catalog number and list price), but which are available as third-party purchases by Distributor (product type 04) or as administrative purchases by Customer (product type 05); e.g., the identification of the third party vendor (by number and name), the vendor's part number, the vendor's offered price and other information shown in Table V. If the CSR has previously created a cross-reference entry in the Cross Reference Table (using Cross Reference Maintenance data screen 76) for the item, some or all of the information on Non-Catalog Information data screen 80 will be automatically filled in using the data associated with that stock number (of the vendor) in the Cross-Reference Table in local database 50. Information associated with products of type 04 will, to at least some extent, be shared with the host computer 10. Information associated with type 05 products will, for the most part, not be shared with the host computer 10. Nevertheless, records about both types of products are maintained in local database 50 and are available for flat file and other information transfers to the Customer's host computer.

For items of product type 04, the Distributor will order the item for the customer and have it sent to the customer. Consequently, the following information must be entered on the Non-Catalog Information data screen 80 for items of

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product type 04: vendor stock number and the vendor number (which corresponds to a particular vendor). These data are forwarded to the host computer 10 to be checked against or added to host database 20 (for products of price type 04, but not for products of price type 05). An error will result in "sourcing" this order if this information is not provided by the CSR or does not correspond to information in host database 20 for a non-catalog item.

For items of product type 05, the CSR will create an order record or document ordering the item on behalf of the customer or confirming an order placed on behalf of the customer (e.g., by telephone to the designated vendor).

For items of product type 05, the CSR may order the item for the Customer. These orders are not placed or filled using the system of the present invention, although data regarding these transactions may be entered on Non-Catalog Information data screen 80 to record these transactions. Instead, either the proposed purchase order record is uploaded into the customer's computer for processing or a document is printed at local printer 43 for signature and action by the customer's purchasing agent or the CSR confirms that the order has been placed with the designated vendor by some other means.

Sourcing

After all of the items for a requisition have been entered, the next step is that of sourcing the requisition. Sourcing the requisition is the process of determining what inventory will be used to fill the requisition. Pricing is also performed in this step when it is called for (e.g., for all product types except for 05 and 06).

Sourcing, which is represented by step 88 in FIG. 2, is initiated by hitting the F6 key from the Requisition Management data screen 68 (or from Order Header data screen 60 or Non-Catalog Information data screen 80.)

Sourcing is performed on both local computer 40 and host computer 10. Sourcing in the preferred embodiment of the system of the present invention can involve up to four different product types: 01—local Distributor-owned JIT items; 03—Distributor catalog items; 04—third-party items which are ordered by the Distributor; Type 06—Customer-owned JIT items. (Product type 05 comprises third-party items which are not sourced by the system of the present invention.) Any particular requisition may involve all of these product types, only a single product type, or any combination of product types.

The product type which was determined when the STOCK NBR was entered on the Requisition Management data screen is now used to source the item. Items of product type 06 are sourced from the Customer-owned Inventory 54; items of product type 01 are sourced from Distributor-owned inventory 52.

Sourcing for each item in the Requisition Item Table will be described in connection with FIGS. 4A through 4D. In step 220, the CSR hits the F6 (Source) key from Requisition Management data screen 68. In steps 221 and 224, the system checks the product type (in the PT field) of the item and routes control of the program according to that product type. If the item is of product type 03 or 04, control passes through point A 222 to the diagram shown in FIG. 4C. If the item is of product type 01 or 06, control passes to block 228. If the item is of product type 05, control passes to point B 226. The processing of transactions of product type 05 by the preferred embodiment of the system of the present invention is of a record keeping nature. In the steps represented by point B 226, the CSR enters the relevant data regarding the

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transaction and the data are stored in local database 50 in the same manner as data relating to the other product types described herein. The data may then be uploaded periodically to the Customer's host computer.

In the case where the item has product type 01 (an item owned by Distributor in JIT facility 51), local computer 40 will prepare and send to host computer 10 a block of data including the stock number (STOCK NBR), product type (PT), warehouse location code (LOC), the requisitioned quantity (QTY), the quantity available at the JIT facility 51 and header data, as shown in step 230. The header data includes at least the account number and requisition number. Local computer 40 then waits for host computer 10 to transmit a block of data in response to the transmission of local computer 40, as shown in step 232. Local computer 40 sends the block of data via the communication linkage described in connection with FIG. 1.

At host computer 10, the data sent by local computer 40 is received as shown in step 250 of FIG. 4B. Host computer 10 first uses the warehouse location code (LOC) and the stock number (STOCK NBR) to access host database 20 to determine what the host's records show for the quantity available at the relevant location for the item being requisitioned, as shown in step 252. The host's quantity available is compared to the received quantity available (QTY AVAIL.) to determine if they match, as shown in step 256. If the quantities are not the same, host computer 10 creates a data block including an inventory match error code, as shown in step 258. This data block will then be transmitted back to local computer 40 via the communication link, as shown in step 272. This insures that the host and local databases are in agreement as to the quantity of an item in JIT facility 51 which is owned by the Distributor.

If, however, the host computer's 10 quantity available does match that in the received QTY AVAIL. field, in step 256, host computer 10 then determines if the quantity available (QTY AVAIL.) is equal to or exceeds the requisitioned quantity (QTY), as shown in step 260. If the quantity available is equal to or exceeds the quantity requisitioned, host computer 10 then prices the item, as shown in step 268 (using the program represented by block 96 of FIG. 2B). Any conventional algorithm or data structure may be employed by host computer 10 for determining the net price per unit of a particular Distributor product sold to a particular Customer as shown in step 268. Such pricing may be based, for example, on Distributor's list price and a percentage discount off that list price negotiated between Distributor and Customer and recorded in host database 20 for that product type. As is described below, the net price per unit is sent from host database 20 through the communications link to the local computer 40 for entry into a previously blank field in the Requisition Item Table.

If the quantity available is determined to be less than the quantity requisitioned in step 260, host computer 10 then creates a warning message indicating a proposed backorder for a quantity equal to the difference between the quantity requisitioned (QTY) and the quantity available (QTY AVAIL.). As will be discussed below, the CSR need not accept this backorder. Host computer then proceeds with pricing step 268.

After pricing is complete, host computer 10 creates a data block including the information regarding any backordered quantities of the item and the net price per unit of the item, as shown in step 270. This data block is then transmitted to local computer 40, as shown in step 272.

In block 234 of FIG. 4A, local computer 40 receives the data block transmitted from host computer 10. Local com-

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